



**GROWING AREA WV
St George, South Thomaston and Owls Head**

ANNUAL REVIEW for 2010

Report Date: 01-30-2012

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APPROVAL

Division Director:

A handwritten signature in blue ink, appearing to read "Kohl Kanwit", is written over a light blue rectangular background.

Kohl Kanwit

1/30/2012

Print name

signature

Date: _____



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Figure 1. Growing Area WV, with Active Sampling Stations



Maine Department of Marine Resources

Shellfish Growing Area WV

2/17/2011

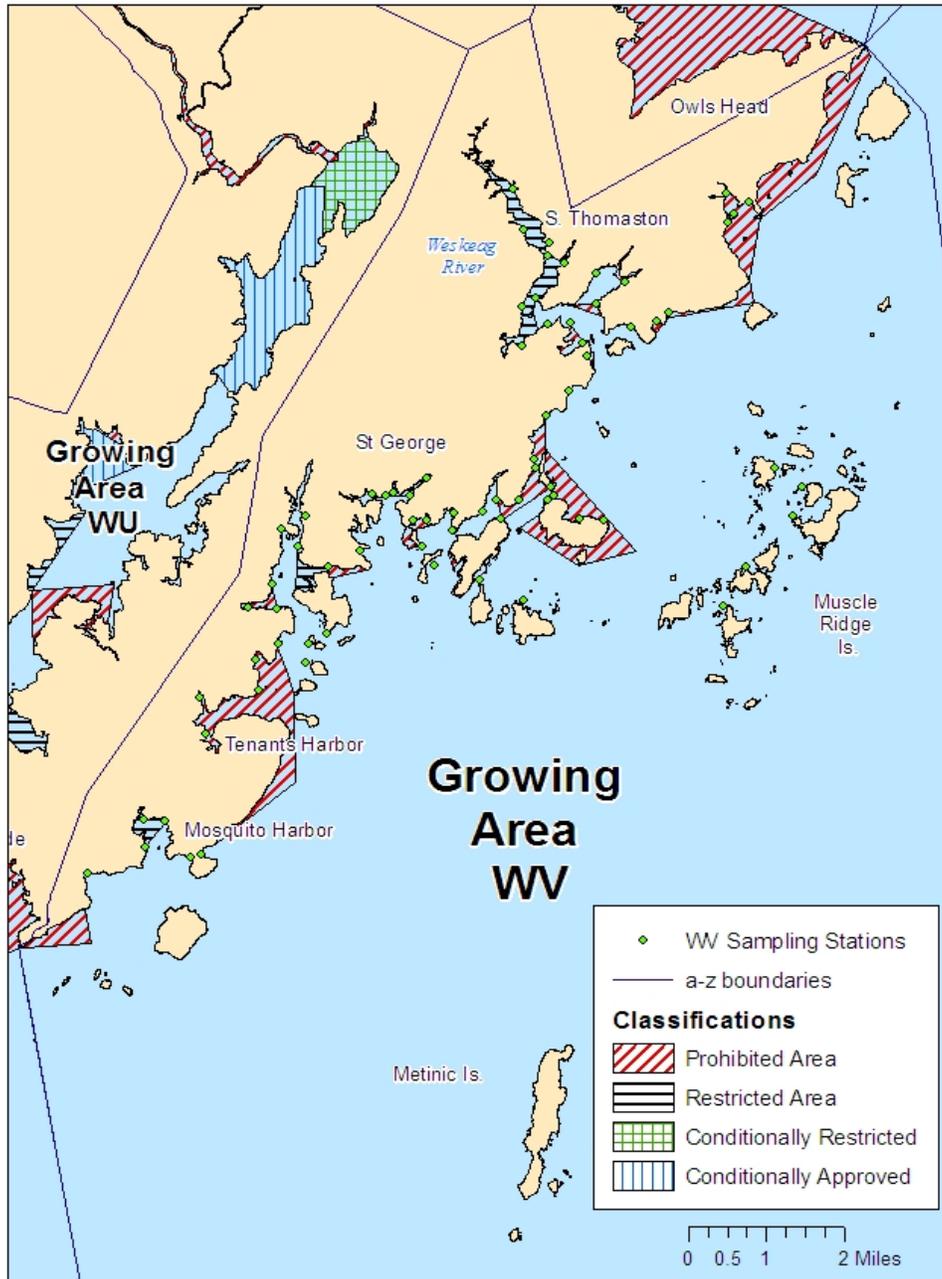




Figure 2. Growing Area WV Southern Sampling Stations



WV Southern Section

12/5/2011

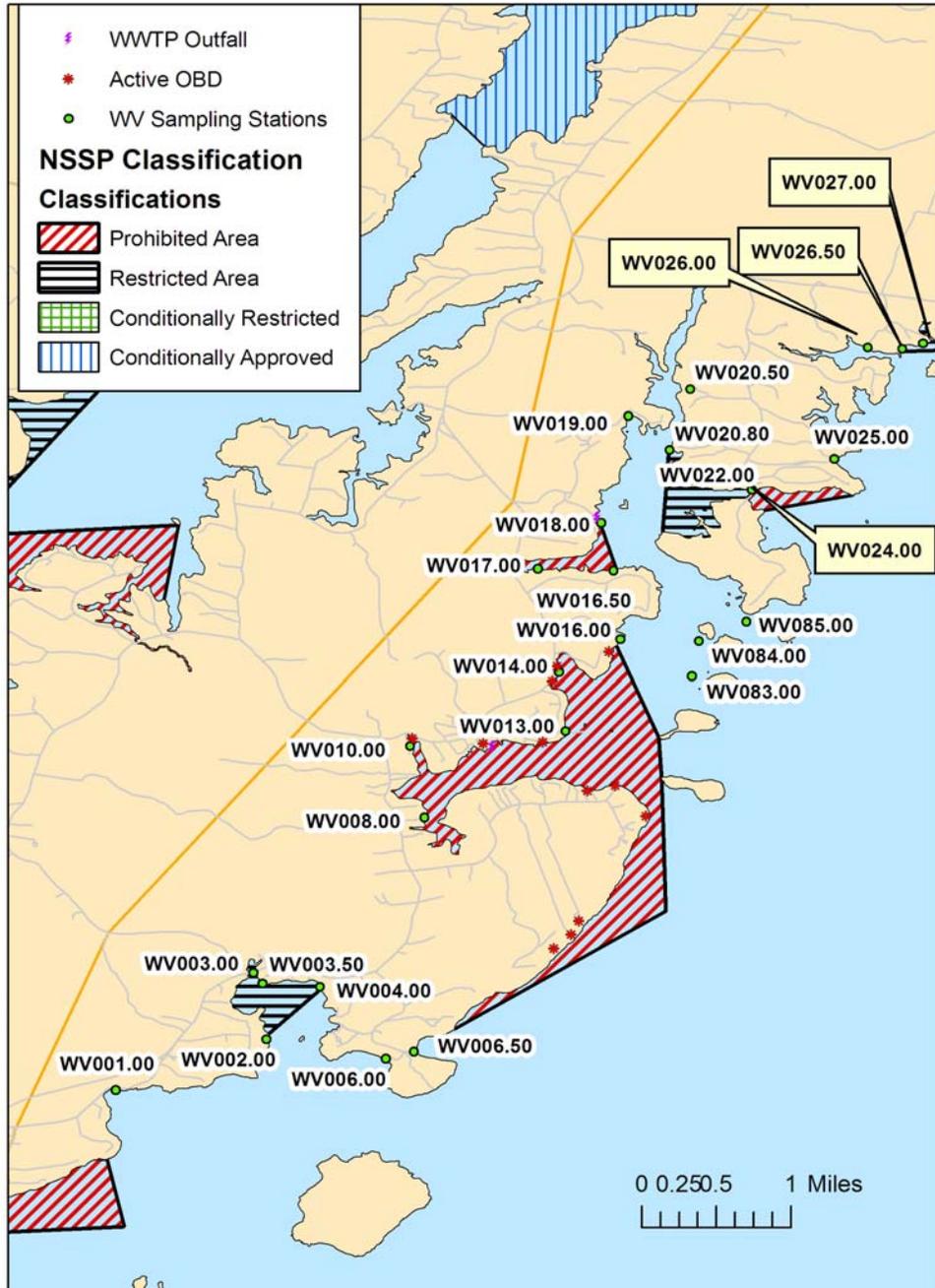




Figure 3. Growing Area WV Middle Stations



WV Middle Section

12/5/2011



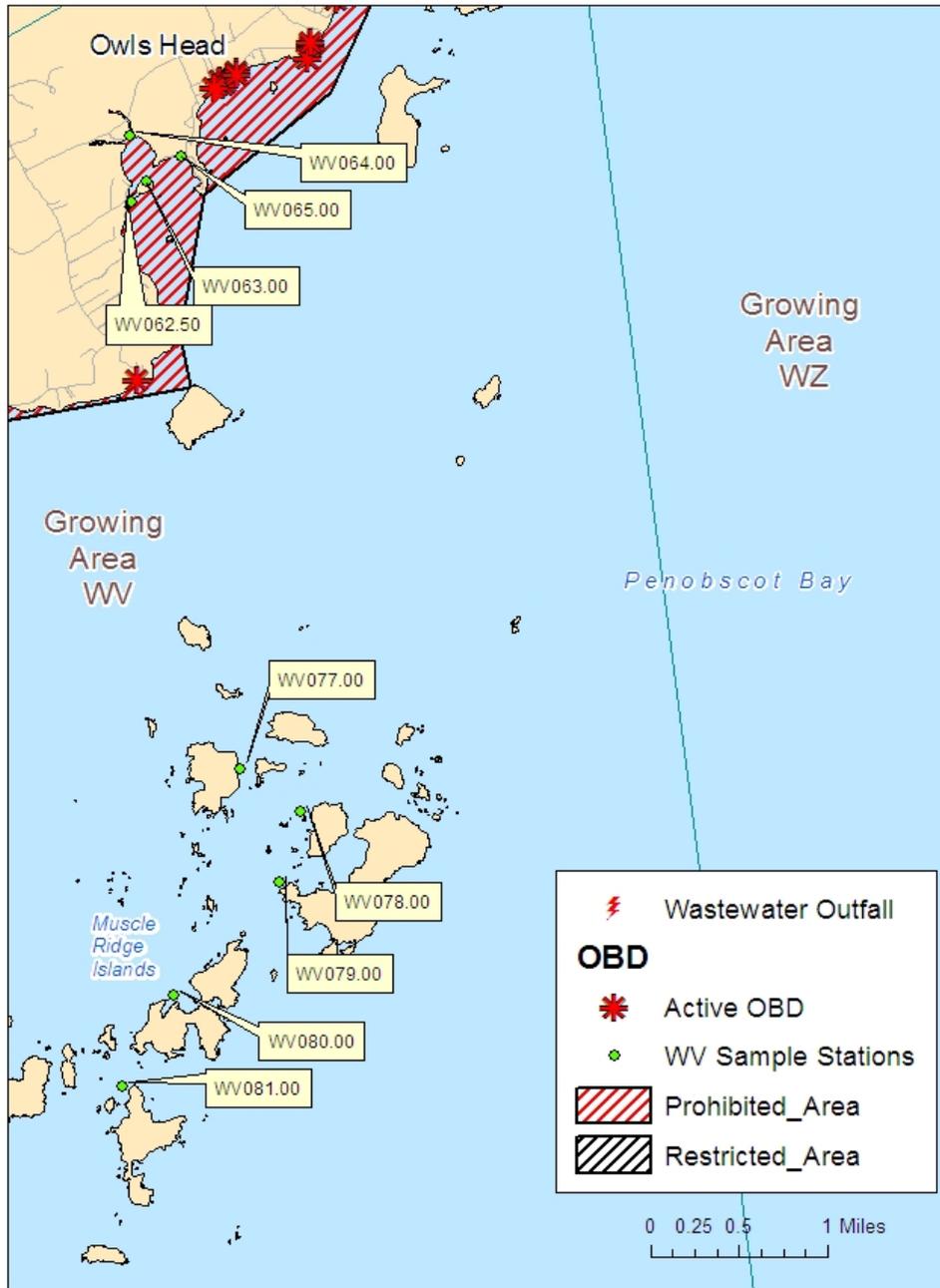


Figure 4. Growing Area WV Northern Stations



Growing Area WV Northern and Muscle Ridge Stations

2/7/2011





Executive Summary

This is an annual report for growing area WV written in compliance with the requirements of the 2009 Model Ordinance and the National Shellfish Sanitation Program.

Growing area WV includes western Penobscot Bay and the Weskeag River. Major sources of pollution in this area include private septic systems, licensed over board discharges (OBDs) and outhouses; there are no municipal waste water facilities in this area. Based on the results of the 2010 annual growing area review, most water quality stations classified as approved are meeting their appropriate NSSP classification standard, however, stations WV 20.5 and 31 both classified as approved through 2010, have deteriorated in water quality and were downgraded on 1/7/2011. The cause for the increases is not immediately evident. During the 2010 review year, no new stations were added and no stations were deactivated. No OBDs were removed during 2010.

Two upward classifications change are being recommended, based on water quality meeting the approved standard in parts of the Weskeag River and Ballyhac Cove.

The next triennial report is due after 2011; the next sanitary survey report is due after 2020.

Growing Area Description

Shellfish Growing Area WV covers the region from Marshall Point, Port Clyde to the northern tip of Owls Head (Figure 1). This growing area includes portions of the towns of St George, South Thomaston and Owls Head. The town of St George includes the villages of Port Clyde, and Tenants Harbor. According to the 2000 census, the town of St George had a year round population of 2,580, the town of South Thomaston, which includes the village of Spruce Head had a year round population of 1,416 and the town of Owls Head had a year round population is 1,601. All of the towns in shellfish growing area WV are small and residential, with the population of each increasing during the summer months. There are no large industries, marinas or large tourist areas in this growing area. Main sources of income for this growing area include lobstering, construction and self employment businesses such as carpentry businesses and artist galleries. While there are no actual marinas in shellfish growing area WV, there are mooring areas that are used by the many local lobster boats. Cruising boats also frequent some of these areas during the summer months, with Tenants Harbor being the most popular mooring area used by cruising boats. There are no sewage treatment facilities in this growing area. The closest sewage treatment facilities to this growing area are located in the towns of Thomaston (growing area WU) and Rockland (growing area WW). The treatment plant outfalls from Thomaston and Rockland enter into water bodies away from the shores and waters of shellfish growing area WV. A detailed overview of this growing area is presented in Figures 2 and 3. The two outfalls located in Figure 2 correspond to a licensed OBD with an outfall at the East Wind Inn in Tenants Harbor and an inactive outfall at the defunct Great Eastern Mussel plant north of Seavey Cove. The OBD is enclosed in a larger prohibited area, and no further closure is required. Should a new business take over the Great Eastern Mussel site, the outfall will be assessed to determine the size of the closure required.



There are five aquaculture lease sites in this growing area. All of the lease sites are located in the Weskeag River. There is also a large conservation area in the upper Weskeag. The Ralf Waldo Tyler Wildlife Management Area is a large marsh consisting of 618 acres that is owned and managed by the Maine Department of Inland Fisheries and Wildlife (IF&W). In addition to the conservation area on the Weskeag, shellfish growing area WV also has two state parks. The Owls Head Light State Park is located at the northern tip of the growing area in the town of Owls Head. This park consists of small hiking trails, beaches, and a lighthouse that is open to the public. Birch Point State Park is also located in the town of Owls Head. This park consists of small trails along the shore and a sandy beach. Both parks are open for daytime use only

Current Classification(s)

At the end of the 2010 review year, shellfish growing area WV had areas classified as:

Approved

- 31 Stations – WV 1, 6, 6.5, 16, 19, 20.5, 25, 26, 31, 32, 35, 36, 36.5, 41, 46.8, 47, 48, 48.5, 48.8, 56, 59, 77, 78, 79, 80, 81, 83, 84, 85, 86, 87, 88, and 89

Restricted

- Pollution Area No. 27-A (St George), Harrington Cove west to a point on Eagle Quarry Rd., stations WV 27, 28, and 28.5 (new) due to water quality exceeding approved standards
- Pollution Area No. 28 (St George) Mosquito Harbor, stations WV 2 (boundary), 3, 3.5 (new) and 4 (boundary), Seavey Cove (St George)- stations WV 16.5 (boundary), 17 and 18 (boundary), and Long Cove (St George), stations WV 20.8 (new) and 22 due to water quality variability
- Pollution Area No. 28-I Upper Weskeag River (South Thomaston), stations WV 49, 50, 50.5, 50.8, 52, 53, 54 and 55 due to water quality variability

Prohibited –

- Pollution Area No. 27-A Calf Island (St George)- Due to an active OBD and Wheeler Bay (St George)- WV 29 and 30
- Pollution Area No. 28 Marshall Point to Clark Cove (St George)- WV 8, 10, 13, 14, due to active OBDs, and 24 due to a malfunctioning septic system
- Pollution Area No. 28B Patten point, St George to Thorndike Point, South Thomaston – WV 37, 38, 39, 40, 44, 45, 46, 46.5, and 47.5, due to active OBDs and water quality not meeting the approved standard
- Pollution Area 28E, Ash Point to Birch Point, Owls Head – WV 61 due to expired survey
- Pollution Area 28 I, Weskeag River, South Thomaston and Owls Head – WV57, 58, and 60 due to expired survey and straight pipes
- Pollution Area 29A, Owls Head – WV 62.5, 63, 64, and 65 due to expired survey and water quality not meeting approved standard



Please visit the DMR website to view legal notices:

http://www.maine.gov/dmr/rm/public_health/closures/closedarea.htm#T

Activity during Review Period

A new station, WV3.5 was created on 10/1/2010. Initially, WV3 was relocated to this spot, however, after the sampling season, it was decided that moving WV3 to its original location and creating a new station entirely would best monitor the cove. Thus, WV 3 was only sampled five times, and WV 3.5 was sampled once.

Water Quality Review and Discussion

Table 1 lists all active approved and prohibited stations in Growing Area WV, with their respective Geometric means (geomean) and P90 calculations for 2010. Please refer to Appendix A for a key to interpreting the headers on the columns of Table 1. The approved standard for each station is also displayed in Table 1.

Most approved stations met their NSSP classification standard in 2010. Stations WV 20.5 and WV 31 exceeded the approved standard and were downgraded to restricted classification on 1/7/2011. All restricted stations met their NSSP classification standard during the review period.

Table 1. Area WV Geomean and P90 scores 2005-2010

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd Std	Restr Std	Min Date
WV001.00	A	30	27	3.8	0.46	68	14.8	32	173	4/3/2006
WV002.00	R	30	27	2.2	0.15	7.3	3.5	32	173	4/3/2006
WV003.00	R	30	28	5.3	0.55	620	27.4	31	169	8/15/2005
WV003.50	R	1	1	1.9		1.9		31	163	11/2/2010
WV004.00	R	30	27	3.5	0.41	43	11.8	32	173	4/3/2006
WV006.00	A	30	27	2.5	0.31	50	6.4	32	173	4/3/2006
WV006.50	A	30	27	2.8	0.26	11	6.2	32	173	4/3/2006
WV008.00	P	30	29	4.8	0.62	240	31.2	31	166	5/22/2006
WV010.00	P	30	29	9.4	0.66	500	66.4	31	166	4/25/2006
WV013.00	P	30	27	3.5	0.4	58	11.7	32	173	4/3/2006
WV014.00	P	30	27	4	0.57	220	22.3	32	173	4/3/2006
WV016.00	A	30	27	2.6	0.41	78	9.1	32	173	4/3/2006
WV016.50	R	30	27	3.2	0.54	1200	16.2	32	173	4/3/2006
WV017.00	R	30	27	5.5	0.89	1700	77.3	32	173	4/3/2006
WV018.00	R	30	27	3	0.51	740	14	32	173	4/3/2006
WV019.00	A	30	27	3.7	0.38	70	11.6	32	173	4/3/2006
WV020.50	A	30	27	6.3	0.61	280	38.6	32	173	4/3/2006
WV020.80	R	21	21	2.4	0.25	16	5.3	31	163	9/25/2007
WV022.00	R	30	27	5.4	0.67	440	40.5	32	173	4/3/2006
WV024.00	P	30	27	3.2	0.49	340	14.1	32	173	4/3/2006
WV025.00	A	30	27	3.1	0.45	102	12	32	173	4/3/2006



Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WV026.00	A	30	26	5	0.48	120	21.2	32	176	12/14/2005
WV026.50	R	20	20	3.5	0.42	52	12.7	31	163	9/5/2007
WV027.00	R	30	26	6.2	0.64	660	41.3	32	176	12/14/2005
WV028.00	R	30	27	5.6	0.58	152	31.3	32	173	12/14/2005
WV028.50	R	20	20	4.2	0.52	138	20.3	31	163	9/5/2007
WV029.00	P	30	25	10	0.92	1700	157	33	180	11/21/2005
WV030.00	P	30	26	11	0.89	1700	152	32	176	12/14/2005
WV031.00	A	30	26	5.1	0.65	1700	35.3	32	176	12/14/2005
WV032.00	A	30	26	3.6	0.38	40	11.4	32	176	12/14/2005
WV035.00	A	30	26	3.3	0.4	36	11	32	176	12/14/2005
WV036.00	A	30	26	3.3	0.34	25	9.3	32	176	12/14/2005
WV036.50	A	30	26	2.7	0.28	23	6.3	32	176	12/14/2005
WV037.00	P	30	26	4.2	0.6	480	25.5	32	176	12/14/2005
WV038.00	P	30	26	3.9	0.46	96	15.5	32	176	12/14/2005
WV039.00	P	30	27	6.2	0.66	940	44.1	32	173	12/14/2005
WV040.00	P	30	26	2.9	0.39	50	9.4	32	176	12/14/2005
WV041.00	A	30	28	3.3	0.37	27	10.2	31	169	4/3/2006
WV044.00	P	30	28	3.1	0.43	106	11.1	31	169	5/22/2006
WV045.00	P	30	28	2.7	0.38	148	8.5	31	169	5/22/2006
WV046.00	P	30	28	2.8	0.27	13	6.4	31	169	5/22/2006
WV046.50	P	30	29	4.1	0.54	102	20.5	31	166	7/18/2006
WV046.80	A	30	28	2.9	0.44	240	10.9	31	169	5/22/2006
WV047.00	A	30	28	2.7	0.27	22	6.2	31	169	5/22/2006
WV047.50	P	30	29	2.3	0.24	35	4.8	31	166	7/18/2006
WV048.00	A	30	28	3.9	0.35	18	11.2	31	169	4/25/2006
WV048.50	A	30	27	2.8	0.23	22	5.6	32	173	4/3/2006
WV048.80	A	30	28	3.4	0.38	44	10.6	31	169	4/3/2006
WV049.00	R	30	28	6.1	0.51	72	28	31	169	4/25/2006
WV050.00	R	30	28	5.6	0.57	240	30.8	31	169	4/25/2006
WV050.50	R	30	27	4.5	0.5	100	19.8	32	173	4/3/2006
WV050.80	R	30	27	6	0.59	156	35.1	32	173	4/3/2006
WV052.00	R	30	27	5	0.54	156	25.1	32	173	4/3/2006
WV053.00	R	30	27	3.2	0.35	46	9.4	32	173	4/3/2006
WV054.00	R	30	27	5.6	0.56	106	29.9	32	173	4/3/2006
WV055.00	R	30	27	3	0.26	15	6.6	32	173	4/3/2006
WV056.00	A	30	28	4.6	0.53	93	22.3	31	169	4/25/2006
WV057.00	P	30	28	7.8	0.81	460	85.3	31	169	4/25/2006
WV058.00	P	30	27	4	0.48	88	16.7	32	173	4/25/2006
WV059.00	A	30	27	2.3	0.25	22	5	32	173	4/3/2006
WV060.00	P	30	27	3.8	0.52	64	17.7	32	173	4/3/2006
WV061.00	P	30	27	2.5	0.23	11	5	32	173	4/3/2006
WV062.50	P	30	27	3.2	0.5	440	14.7	32	173	4/3/2006
WV063.00	P	30	28	3.6	0.42	64	12.6	31	169	4/3/2006
WV064.00	P	30	28	5.3	0.67	1440	39	31	169	4/25/2006
WV065.00	P	30	27	2.7	0.3	27	6.6	32	173	4/3/2006



Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WV077.00	A	30	27	2.2	0.15	10	3.5	32	173	5/24/2006
WV078.00	A	30	27	2.1	0.17	15	3.6	32	173	5/24/2006
WV079.00	A	30	27	2	0.08	3.6	2.5	32	173	5/24/2006
WV080.00	A	30	27	2.1	0.12	6	3.1	32	173	5/24/2006
WV081.00	A	30	27	2.1	0.14	7.3	3.3	32	173	5/24/2006
WV083.00	A	30	27	1.9	0.05	2.9	2.3	32	173	5/24/2006
WV084.00	A	30	27	2	0.06	2.9	2.4	32	173	5/24/2006
WV085.00	A	30	27	2.2	0.17	9.1	3.7	32	173	5/24/2006
WV086.00	A	30	27	2.6	0.39	240	8.4	32	173	5/24/2006
WV087.00	A	30	27	2.1	0.2	23	4	32	173	5/24/2006
WV088.00	A	30	27	2	0.1	6	2.8	32	173	5/24/2006
WV089.00	A	30	27	2.1	0.18	18	3.6	32	173	5/24/2006

All Approved and Restricted stations active at the beginning of 2010 were sampled randomly at least six times. Station WV3 was sampled five times due to changes referenced in the *Activity During the Review Period* section above. Due to a scheduling error, stations WV 26, 26.5, 27, 28, 28.5, 31, 32, 35, 36 and 36.5 were sampled randomly once during a flood closure and were not made up. Stations WV 16.5, 19, 31, 37 and 48.5 served as flood closure re-opening sample stations and were sampled additionally under adverse conditions.

Table 2. Growing Area WV 2010 Sampling Effort

Station	Class	Adverse	Random		Total	Comments
		Closed	Closed	Open		
WV001.00	A			6	6	
WV002.00	R			6	6	
WV003.00	R			5	5	
WV003.50	R			1	1	New Station
WV004.00	R			6	6	
WV006.00	A			6	6	
WV006.50	A			6	6	
WV008.00	P		6		6	
WV010.00	P		6		6	
WV013.00	P		6		6	
WV014.00	P		6		6	
WV016.00	A			6	6	
WV016.50	R	26		6	32	Flood Station
WV017.00	R			6	6	
WV018.00	R			6	6	
WV019.00	A	26		6	32	Flood Station
WV020.50	A			6	6	
WV020.80	R			6	6	
WV022.00	R			6	6	



		Adverse	Random			
WV024.00	P		6		6	
WV025.00	A			6	6	
WV026.00	A		1	5	6	
WV026.50	R		1	5	6	
WV027.00	R		1	5	6	
WV028.00	R		1	5	6	
WV028.50	R		1	5	6	
WV029.00	P		6		6	
WV030.00	P		6		6	
WV031.00	A	28	1	5	34	Flood Station
WV032.00	A		1	5	6	
WV035.00	A		1	5	6	
WV036.00	A		1	5	6	
WV036.50	A		1	5	6	
WV037.00	P	24	6		30	Flood Station
WV038.00	P		6		6	
WV039.00	P		6		6	
WV040.00	P		6		6	
WV041.00	A		1	6	7	
WV044.00	P		7		7	
WV045.00	P		7		7	
WV046.00	P		7		7	
WV046.50	P		7		7	
WV046.80	A			7	7	
WV047.00	A			7	7	
WV047.50	P		7		7	
WV048.00	A			6	6	
WV048.50	A	22		6	28	Flood Station
WV048.80	A			6	6	
WV049.00	R			6	6	
WV050.00	R			6	6	
WV050.50	R			6	6	
WV050.80	R			6	6	
WV052.00	R			6	6	
WV053.00	R			6	6	
WV054.00	R			6	6	
WV055.00	R			6	6	
WV056.00	A			6	6	

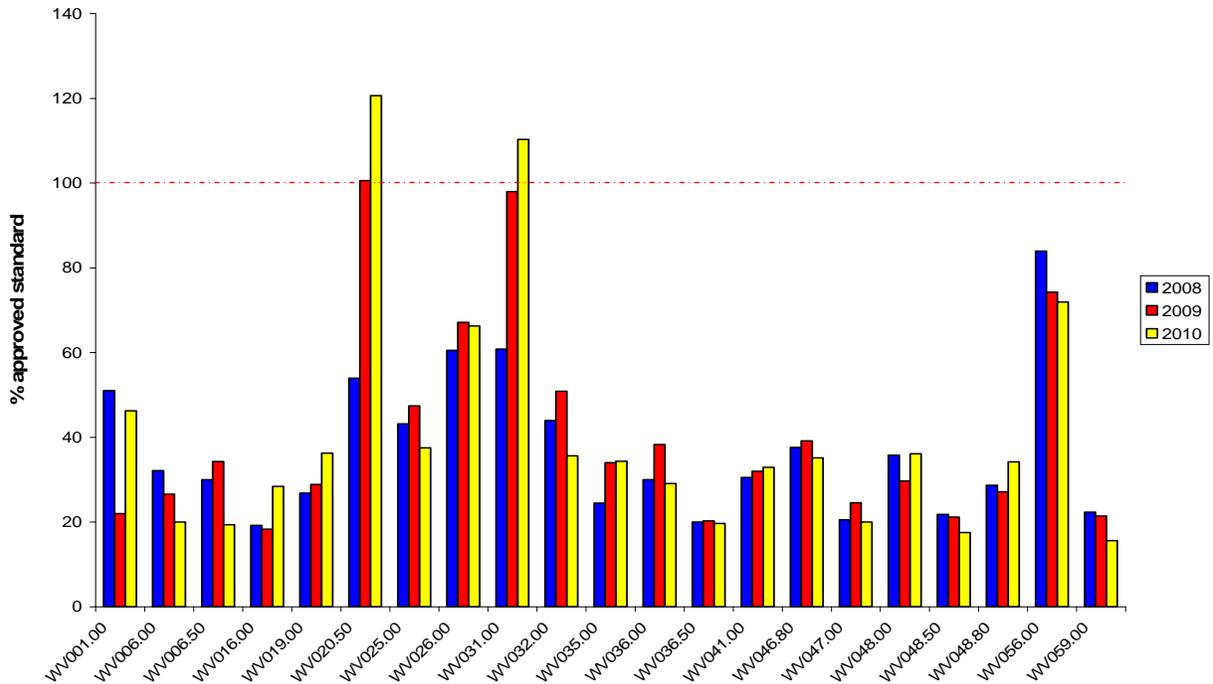


		Adverse	Random			
WV057.00	P		6		6	
WV058.00	P		6		6	
WV059.00	A			6	6	
WV060.00	P		6		6	
WV061.00	P		6		6	
WV062.50	P		6		6	
WV063.00	P		6		6	
WV064.00	P		6		6	
WV065.00	P		6		6	
WV077.00	A			6	6	
WV078.00	A			6	6	
WV079.00	A			6	6	
WV080.00	A			6	6	
WV081.00	A			6	6	
WV083.00	A			6	6	
WV084.00	A			6	6	
WV085.00	A			6	6	
WV086.00	A			6	6	
WV087.00	A			6	6	
WV088.00	A			6	6	
WV089.00	A			6	6	

Figure 5 displays a three year P90 trend for the approved stations in WV. Most approved stations were below the NSSP limit. At most stations there were slight variations in P90 scores, however, two stations (WV20.5 and 31), which had previously been on the verge of not meeting the approved standard surpassed the limit and will have to be downgraded to restricted on 1/7/2011. Station WV1 has shown some variation within the past three years (Figure 2). Between 2008 and 2009, the P90 score dropped by 40 percent, from 19.1 CFU/ 100 mL in 2008 to 7.7 CFU/ 100 mL in 2009, only to rebound to 14.8 CFU/ 100 mL in 2010 (a 52 percent increase). It is unknown what caused this variability, however, the overall P90 shows a downward trend, and is not near the approved limit.

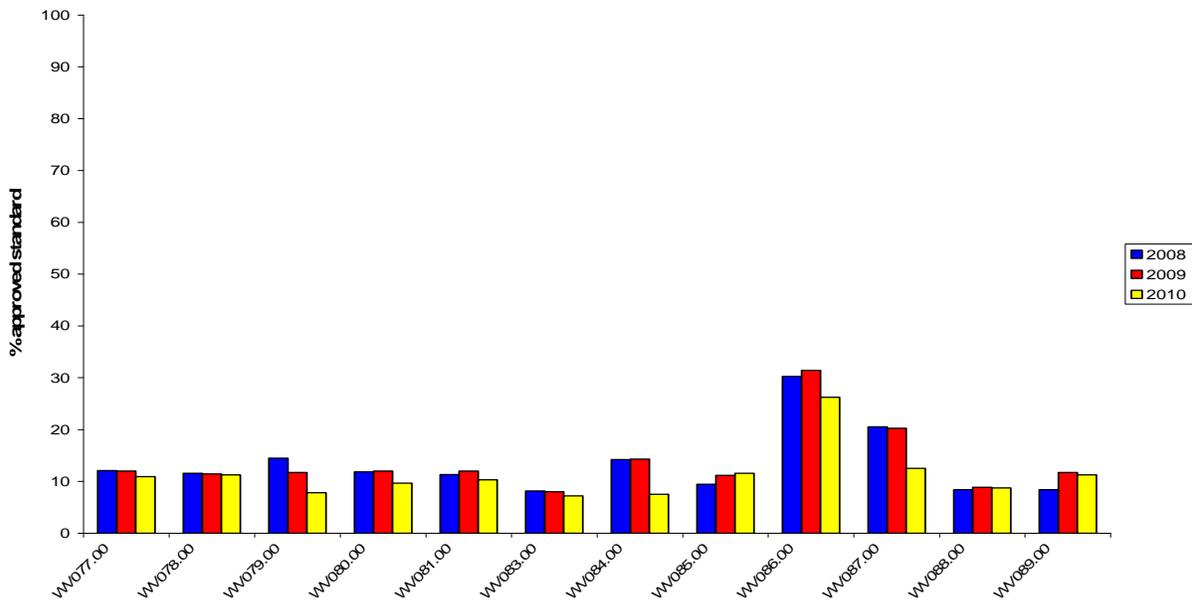


Figure 5. Area WV P90 Scores for Approved Stations (expressed as the percent of the approved standard), 2008-2010



Growing area WV also includes several stations around the Muscle Ridge Islands, located in Western Penobscot Bay. These stations are classified as approved and continue to have outstanding water quality (Figure 6).

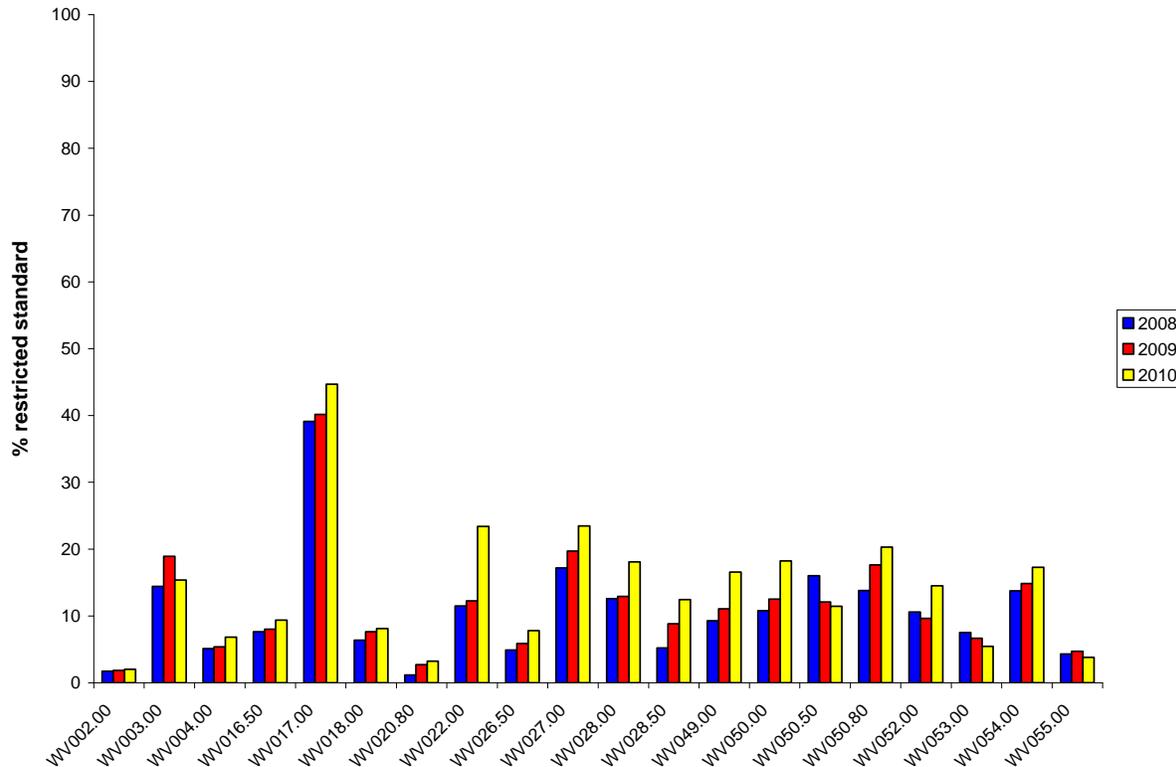
Figure 6. WV P90 Scores for Approved Muscle Ridge Stations (expressed as the percent of the approved standard), 2008-2010





All Restricted stations in growing area WV met the NSSP classification. Most restricted stations increased individual P90 scores slightly over the previous year, although four stations (WV 3, 50.5, 53 and 55) do show a decrease (Figure 4).

Figure 7. WV P90 Scores for Restricted Stations (expressed as the percent of the restricted standard), 2008-2010



Upward Classification Changes

Two areas, one in the upper Weskeag River and a portion of Ballyhac Cove are being proposed for upgrade due to improvement in water quality. Justification for these upgrades are presented in this section.

Upper Weskeag River

The Weskeag River is located in South Thomaston. The upper river, north of the Route 73 Bridge, is monitored by station WV 50.5 on the western bank and stations WV 52 and 50.8 on the eastern bank (Figure 3). There is little development further upstream, and access to the river is difficult. At the north end of the river is the Ralph Waldo Tyler Salt Marsh, a natural attraction for waterfowl. South of Route 73, the river is monitored by WV 54 and 55 on the eastern shore and WV 49 and 50 on the western bank (Figure 3). The upper river is classified as restricted due to variability in water quality, most likely due to the large number of wildlife that live in the area. The last survey for this area was completed in 2008.



Shellfish resource is mainly aquaculture based, as the warmer, brackish waters are an excellent growing area for oysters. There is some commercial interest in reclassifying the upper river, as relaying in this area is a labor intensive procedure and is also hampered by tidal restrictions.

Figure 8 illustrates individual fecal score trends from 2006 through 2010 for monitoring stations in the upper Weskeag River. Of the eight stations shown, only WV 50.5 and 53 show a downward trend over the last three years. WV 55 has been below the approved standard, though there was a slight increase in P90 score in 2009. Water quality at the remaining stations (WV 49, 50, 50.8, 52, and 54) has fluctuated within the previous five years (Figure 8). The reason for this fluctuation is unclear. A malfunctioning septic system (replaced in 2009) had been identified close to WV 50.5, but it is unlikely that this had any effect on water quality, since WV 50.5 has shown an overall downward trend.

Based on these trends, the portion of the Weskeag River extending from WV 50.5 south to WV 55 (including WV 53 and excluding the coves encompassing WV 52 and 54) will be assessed for a possible upgrade in classification.

Figure 8. P90 Scores for Upper Weskeag Stations (expressed as a percent of the approved standard), 2006-2010

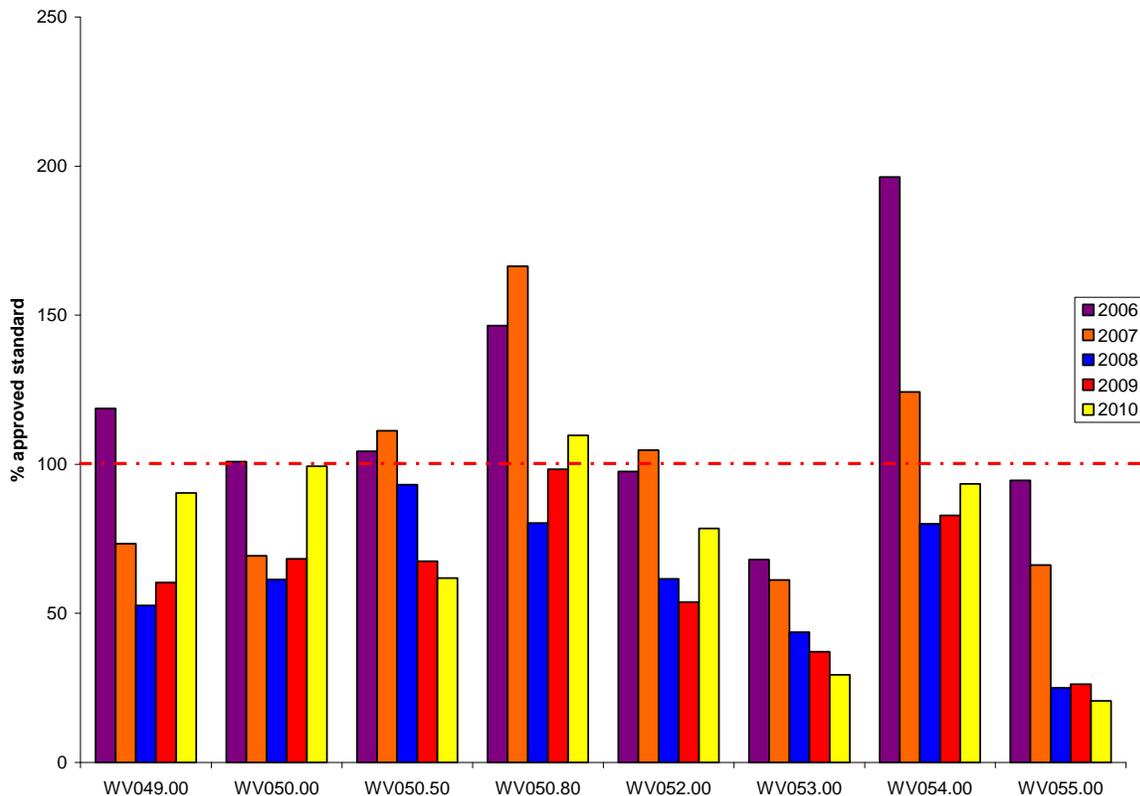


Table 3 shows the geomean and P90 score through the end of 2010. While all of the stations, with the exception of WV 50.8, meet the approved standard, several of them are very close to exceeding it.



Table 3. Geomean and P90 score for upper Weskeag River Stations, 2006-2010

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std
WV049.00	R	30	28	6.1	0.51	72	28	31
WV050.00	R	30	28	5.6	0.57	240	31	31
WV050.50	R	30	27	4.5	0.5	100	20	32
WV050.80	R	30	27	6	0.59	156	35	32
WV052.00	R	30	27	5	0.54	156	25	32
WV053.00	R	30	27	3.2	0.35	46	9.4	32
WV054.00	R	30	27	5.6	0.56	106	30	32
WV055.00	R	30	27	3	0.26	15	6.6	32

Rainfall of greater than 0.5 inches has a negative impact on all stations in the upper Weskeag River (Table 4). P90 scores are greatly increased. Stations WV 49, 53 and 55 do not exceed the approved standard for geomean. A more detailed assessment of rainfall is presented in Tables 8-10.

Table 4. Geomean and P90 score for WV 50.5 after Rainfall of 0.5 Inches or Greater, 2003-2010

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std
WV049.00	R	12	7	13	0.66	240	98	37
WV050.00	R	12	7	18	0.61	240	112	37
WV050.50	R	11	5	19	0.61	240	116	39
WV050.80	R	10	4	42	0.77	1100	437	40
WV052.00	R	11	5	24	0.55	150	125	39
WV053.00	R	11	5	12	0.52	93	56	39
WV054.00	R	11	5	32	0.66	460	236	39
WV055.00	R	11	5	8.7	0.77	1200	89	39

Ebb tide only affects WV 50.8, 52 and 54 (Table 5). WV 50.8 is the furthest station upriver, and is most likely influenced by pollution coming downstream from the salt marsh. At both WV 52 and 54, there are streams that possibly contribute to increased bacteria levels at lower tides.

Table 5. Ebb Tide Assessment for Upper Weskeag River Stations, 2003-2010

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WV049.00	R	14	8	5.8	0.42	43	21	37	211	4/1/2003
WV050.00	R	16	10	6	0.44	46	23	36	204	4/1/2003
WV050.50	R	15	9	4.4	0.3	14	11	37	208	7/8/2003
WV050.80	R	21	12	6.7	0.7	1100	55	37	211	7/8/2003
WV052.00	R	20	12	7.6	0.66	156	55	37	208	7/8/2003
WV053.00	R	18	9	3.3	0.41	46	12	38	221	4/1/2003
WV054.00	R	24	14	8	0.64	460	55	37	210	4/1/2003
WV055.00	R	24	14	4.6	0.56	1200	25	37	210	4/1/2003

Flood tide increases the P90 score for WV 50.5 and 50.8 (Table 6). It is unclear why this is, because WV 52, the closest station is not impacted at all by flood tide. The increase at WV 50.5 will be detailed in Tables 7 and 8.



Table 6. Flood Tide Assessment for Upper Weskeag River Stations, 2003-2010

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Restr_Std	Min_Date
WV049.00	R	35	20	6.6	0.54	240	33	37	211	7/1/2003
WV050.00	R	33	18	5.5	0.56	240	30	38	215	7/1/2003
WV050.50	R	35	18	7.2	0.6	240	43	38	219	4/1/2003
WV050.80	R	30	15	7.2	0.62	156	46	38	221	4/1/2003
WV052.00	R	30	15	5.8	0.48	93	25	38	221	4/1/2003
WV053.00	R	32	18	4.9	0.47	93	20	37	212	7/1/2003
WV054.00	R	25	13	6.1	0.56	106	32	38	218	7/30/2003
WV055.00	R	25	13	3.8	0.38	43	12	38	218	7/30/2003

Table 7 shows what percentage of samples at each flood tide stage surpasses the approved standard. Low flood deteriorates water quality the most, followed by High flood and High tide. Flood tide does not exceed the approved standard. Table 8 goes into more detail about these samples.

Table 7. Tidal Stage Impact Assessment for WV 50.5, 2003-2010

Station	Class	Flood Tide							
		Flood N	% Flood Exceed	High N	% High Exceed	High Flood N	%HighFlood Exceed	Low Flood N	%Low Flood Exceed
WV050.50	R	9		13	8%	10	20%	3	33%

In tables presented in this section, 'Rain 3 Days' refers to cumulative rainfall occurring three days before sample was collected; 'Rain 4 Days' refers to cumulative rainfall 3 days prior, plus the day of collection. The scores displayed are individual sample results.

Since 2003, WV50.5 has exceeded the Approved standard four times (Table 8). Three of these samples are associated with rainfall of greater than 0.5 inches. There is also an evident seasonality to the increased fecal scores, which occurred between May and August. Tide stage appears to be less important in increasing fecal coliform counts than rainfall or season.

Table 8. Station WV50.5 Rainfall and Seasonal Impact 2003-2010

Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01-Apr-03	1.04	1.07	H	26				2.9								
01-Jul-03	0.08	0.08	HF	30							7.3					
08-Jul-03	0.01	0.01	HE	32							9.1					
30-Jul-03	0.01	0.06	F	30							43					
28-Aug-03	0.03	0.03	F	30								43				
22-Sep-03	0.31	0.35	H	30									2.9			
27-Oct-03	1.63	1.63	H	30										9.1		
20-Jan-04	0.07	0.07	H	30	3.6											
08-Mar-04	0.03	0.23	F	24			23									



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
26-Apr-04	0.41	0.41	LF	25				2.9								
25-May-04	0.95	1.42	LF	10					240							
22-Jul-04	0.00	0.32	F	28							3.6					
30-Sep-04	0.05	0.06	HF	30									9.1			
15-Feb-05	1.00	1.00	F	10		43										
24-Mar-05	0.00	0.00	E	17			3.6									
26-Apr-05	1.12	1.16	HF	25				9.1								
27-Jun-05	0.00	0.00	F	29						43						
01-Aug-05	0.32	0.32	H	30								9.1				
29-Nov-05	0.01	0.01	E	25											3.6	
06-Dec-05	0.00	0.00	F	22												3.6
03-Apr-06	0.08	0.08	E	30				3.6								
22-May-06	1.54	1.54	E	26					3							
18-Jul-06	0.00	0.00	E	29							14					
28-Aug-06	0.71	0.73	HF	27								100				
16-Oct-06	0.01	0.01	H	28										1.9		
28-Nov-06	0.00	0.00	E	28											2	
26-Feb-07	0.00	0.00	E	30		1.9										
23-Apr-07	0.00	0.00	LF	18				1.9								
12-Jun-07	0.08	0.08	H	27						48						
08-Aug-07	1.28	1.28	E	30								14				
26-Sep-07	0.01	0.01	H	30									1.9			
10-Dec-07	0.07	0.27	H	30												2
23-Jan-08	0.00	0.00	HF	30	1.9											
17-Mar-08	0.17	0.17	HF	24			1.9									
19-May-08	0.06	0.06	HF	27					1.9							
14-Jul-08	0.01	0.01	H	30							1.9					
02-Sep-08	0.00	0.00	F	30									1.9			
27-Oct-08	0.44	0.44	E	28										10		
11-Feb-09	0.06	0.06	E	30		1.9										
17-Mar-09	0.00	0.00	HE	28			1.9									



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
05-May-09	0.30	0.35	H	27					2							
22-Jul-09	0.62	0.62	HF	26							52					
17-Aug-09	0.00	0.01	HE	30								4				
30-Sep-09	0.56	2.04	H	28									22			
13-Apr-10	0.00	0.03	HF	20				1.9								
27-Apr-10	0.08	0.09	HF	28				5.5								
02-Jun-10	0.51	0.51	F	30						8						
20-Jul-10	0.00	0.00	L	30							6					
14-Sep-10	0.08	0.08	H	30									3.6			
01-Nov-10	0.07	0.08	E	30											6	

Since 2003, WV 53 has only exceeded the approved standard three times (Table 9). This station is located just south of the Route 73 Bridge, where flow is restricted. Freshwater and saltwater mix readily through this area, due to the bottleneck caused by Route 73. Rainfall greater than 0.5 inches appears to a factor in two of the samples, however the first sample to exceed the approved standard (August 28, 2003) was not impacted by rainfall. This station has not exceeded the approved standard since 2007.

Table 9. Station WV53 Rainfall and Seasonal Impact 2003-2010

Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01-Apr-03	1.04	1.07	HE	26				2.9								
01-Jul-03	0.08	0.08	H	30							3					
08-Jul-03	0.01	0.01	HE	32							2.9					
30-Jul-03	0.01	0.06	F	30							3.6					
28-Aug-03	0.03	0.03	F	30								93				
22-Sep-03	0.31	0.35	HE	31									3.6			
27-Oct-03	1.63	1.63	H	30										43		
20-Jan-04	0.07	0.07	HE	31	3.6											
08-Mar-04	0.03	0.23	F	31			2.9									
26-Apr-04	0.41	0.41	F	20				2.9								
25-May-04	0.95	1.42	LF	20					93							
22-Jul-04	0.00	0.32	F	30							2.9					
30-Sep-04	0.05	0.06	HF	30									2.9			
15-Feb-	1.00	1.00	F	26		7.3										



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
05																
24-Mar-05	0.00	0.00	E	29			3									
26-Apr-05	1.12	1.16	HF	21				3.6								
27-Jun-05	0.00	0.00	F	30						15						
01-Aug-05	0.32	0.32	H	30								2.9				
29-Nov-05	0.01	0.01	E	23											43	
06-Dec-05	0.00	0.00	HF	30												3.6
03-Apr-06	0.08	0.08	LE	30				2.9								
22-May-06	1.54	1.54	E	30					2.9							
18-Jul-06	0.00	0.00	E	30							2.9					
28-Aug-06	0.71	0.73	HF	30								18				
16-Oct-06	0.01	0.01	HE	30										2		
28-Nov-06	0.00	0.00	L	28											2	
26-Feb-07	0.00	0.00	L	30		1.9										
23-Apr-07	0.00	0.00	L	22				1.9								
12-Jun-07	0.08	0.08	H	29						4						
08-Aug-07	1.28	1.28	E	30								46				
26-Sep-07	0.01	0.01	H	30									1.9			
10-Dec-07	0.07	0.27	F	30												4
23-Jan-08	0.00	0.00	F	30	2											
17-Mar-08	0.17	0.17	H	28			3.6									
19-May-08	0.06	0.06	HF	28					1.9							
14-Jul-08	0.01	0.01	E	30							2					
02-Sep-08	0.00	0.00	F	30									9.1			
27-Oct-08	0.44	0.44	HE	30										1.9		
02-Feb-09	0.00	0.00	F	30		1.9										
17-Mar-09	0.00	0.00	HF	24			1.9									
05-May-09	0.30	0.35	HE	28					2							
22-Jul-09	0.62	0.62	H	29							18					
17-Aug-09	0.00	0.01	E	30								2				
30-Sep-09	0.56	2.04	H	32									6			



Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
13-Apr-10	0.00	0.03	HF	28				1.9								
27-Apr-10	0.08	0.09	HF	29				1.9								
02-Jun-10	0.51	0.51	HF	30						6						
20-Jul-10	0.00	0.00	H	30							6					
14-Sep-10	0.08	0.08	H	30									2			
01-Nov-10	0.07	0.08	H	30											1.9	

There has been only one occurrence where WV 55 exceeded the approved standard since 2003 (Table 10). It is unknown what caused this, however, rainfall totaled 1.63 inches four days before the sample was collected. Similar rainfall amounts in the eight year time frame (2003-2010) have not produced high fecal scores.

Table 10. Station WV55 Rainfall and Seasonal Impact 2003-2010

Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
01-Apr-03	1.04	1.07	HE	26				2.9								
01-Jul-03	0.08	0.08	HE	31							2.9					
30-Jul-03	0.01	0.06	H	30							3					
28-Aug-03	0.03	0.03	H	30								15				
22-Sep-03	0.31	0.35	HE	30									9.1			
27-Oct-03	1.63	1.63	HE	32										1200		
20-Jan-04	0.07	0.07	HE	31	9.1											
08-Mar-04	0.03	0.23	HF	31			2.9									
26-Apr-04	0.41	0.41	F	26				2.9								
25-May-04	0.95	1.42	F	26					23							
22-Jul-04	0.00	0.32	HF	30							3.6					
30-Sep-04	0.05	0.06	H	31									3.6			
15-Feb-05	1.00	1.00	F	30		2.9										
24-Mar-05	0.00	0.00	E	29			3.6									
26-Apr-05	1.12	1.16	HF	30				7.3								
27-Jun-05	0.00	0.00	F	30						43						
01-Aug-05	0.32	0.32	H	30								3.6				
29-Nov-05	0.01	0.01	E	25											3.6	
06-Dec-05	0.00	0.00	HF	30												3.6
03-Apr-	0.08	0.08	L	30				2.9								



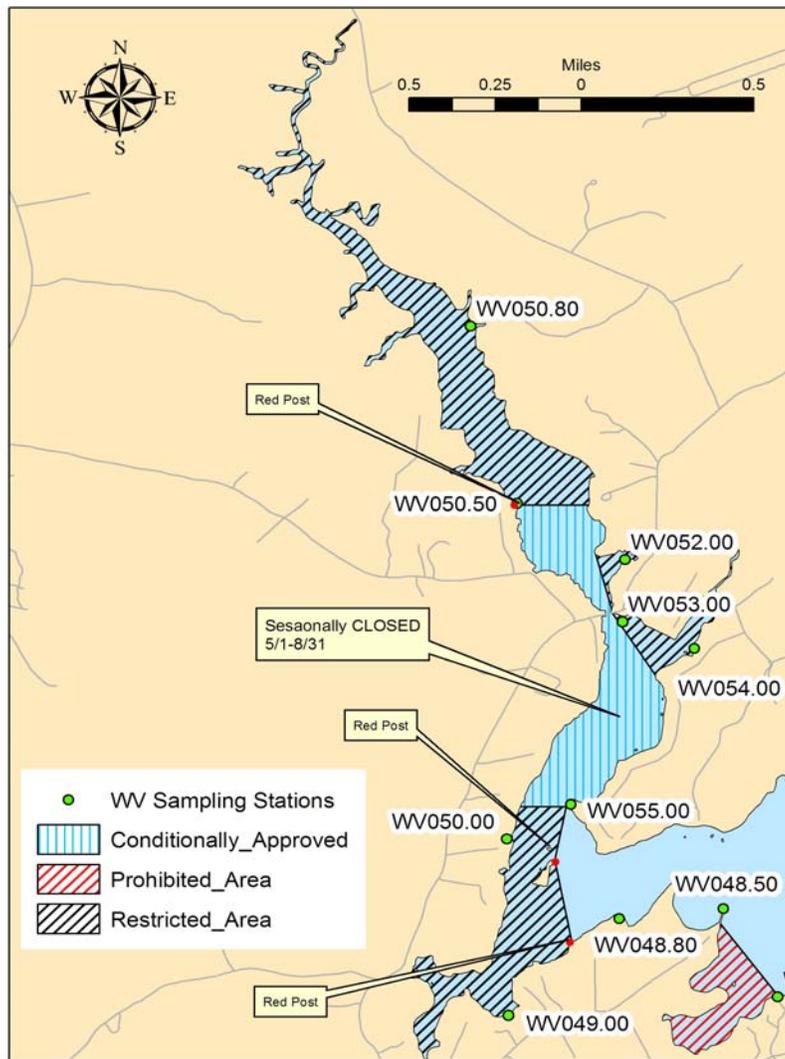
Date	Rain 3	Rain 4	Tide	Sal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
06																
22-May-06	1.54	1.54	E	26					3.6							
18-Jul-06	0.00	0.00	E	30							2.9					
28-Aug-06	0.71	0.73	H	30								5.5				
16-Oct-06	0.01	0.01	HE	30										10		
28-Nov-06	0.00	0.00	L	30											6	
26-Feb-07	0.00	0.00	E	31		2										
23-Apr-07	0.00	0.00	LF	24				1.9								
12-Jun-07	0.08	0.08	HE	29						8						
08-Aug-07	1.28	1.28	E	29								4				
26-Sep-07	0.01	0.01	HE	30									1.9			
10-Dec-07	0.07	0.27	H	30												1.9
23-Jan-08	0.00	0.00	H	30	1.9											
17-Mar-08	0.17	0.17	HE	26			1.9									
19-May-08	0.06	0.06	H	28					1.9							
14-Jul-08	0.01	0.01	E	30							1.9					
02-Sep-08	0.00	0.00	F	30									2			
27-Oct-08	0.44	0.44	HE	30										2		
02-Feb-09	0.00	0.00	F	30		1.9										
17-Mar-09	0.00	0.00	HF	30			1.9									
05-May-09	0.30	0.35	HE	28					6							
22-Jul-09	0.62	0.62	H	29							15					
17-Aug-09	0.00	0.01	E	30								4				
30-Sep-09	0.56	2.04	HE	31									2			
13-Apr-10	0.00	0.03	H	26				1.9								
27-Apr-10	0.08	0.09	H	28				1.9								
02-Jun-10	0.51	0.51	HF	31						6						
20-Jul-10	0.00	0.00	E	30							6					
14-Sep-10	0.08	0.08	HF	31									2			
01-Nov-10	0.07	0.08	E	30											1.9	



Though much of the upper Weskeag River has shown improvements in fecal coliform scores, there is still too much variability in water quality to reclassify the entire upper river to approved. However, a seasonal conditional area is recommended. Starting from a red painted post at WV 50.5 and moving downriver, the conditional area encompasses WV 53 and ends at WV 55 (Figure 9). Due to variability in water quality and water quality not meeting the approved standard, the coves containing WV 52 and WV 54 will remain restricted, as detailed in Figure 9. Similarly, there is too much fluctuation at WV 50 and 49 at the present time to upgrade these stations, which will remain restricted.

Figure 9. Detail of Proposed Upgrade to Upper Weskeag River

Proposed Reclassification of Weskeag River





Due to water quality meeting the approved standard from September 1st through April 30th, it is proposed that a portion of the Weskeag River should be upgraded from restricted to conditionally approved, as detailed in Figure 9.

Ballyhac Cove

Station WV 58, located on the southeastern bank of Ballyhac Cove in Owls Head was classified as Prohibited due to shorefront camps with a straight pipe (Figure 10). The two camps are uninhabitable. Both structures are dilapidated, have no electricity or running water; one is falling down outright. There are two newer houses with septic systems (as of 2005). The old straight pipes are not in use, or usable. The last survey of this area was completed in 2008, and no problems were reported. The justification for upgrading the prohibited area to approved is explained in this section.

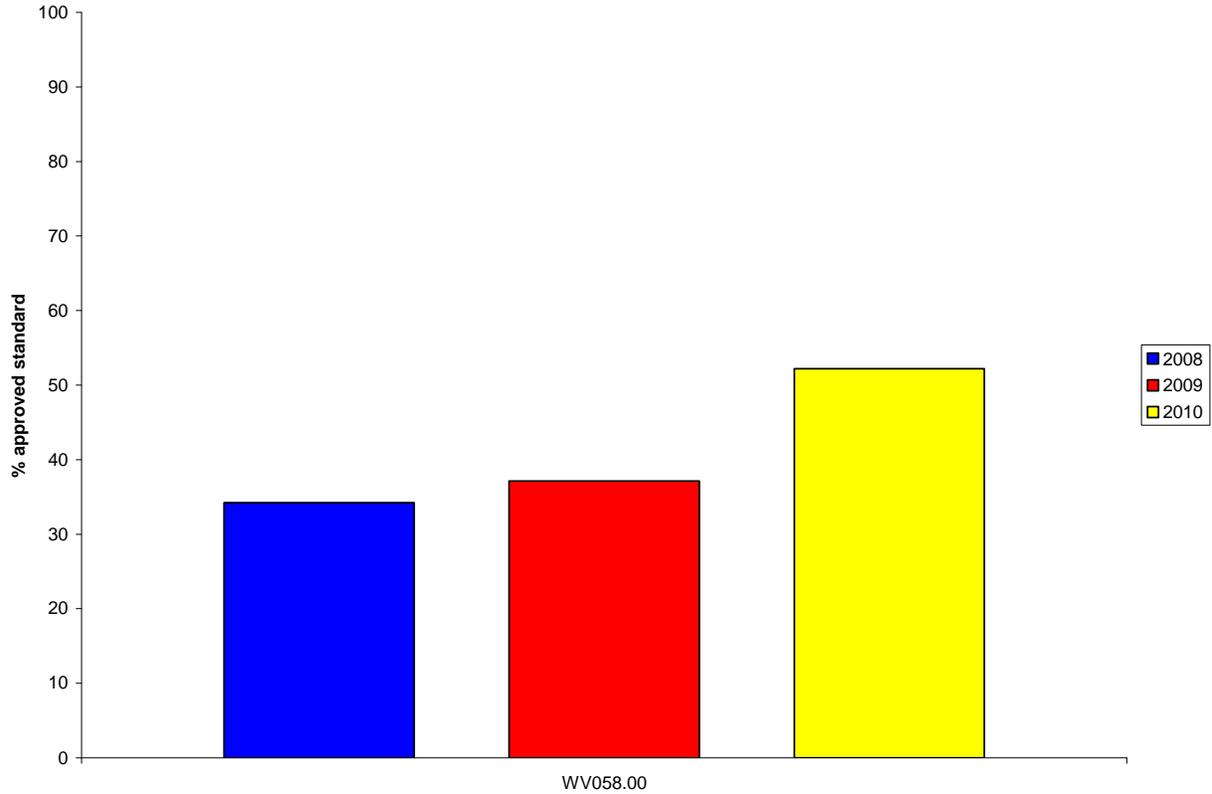
Figure 10. Detail of Old Camps on Ballyhac Cove





Fecal coliform scores for station WV 58 have increased slightly over the past three years; however the scores remain below the approved standard (Figure 11). It is unknown what caused the increase at this station.

Figure 11. P90 Scores for WV 58 (expressed as a percent of the approved standard) 2008-2010



A tidal assessment of station WV58 shows that tides do not impact the station (Table 11). Similarly, a rainfall assessment of water quality at WV 58 after rainfall of 0.5 inches or greater does not have an impact on WV58 (Table 12).

Table 11. Tidal Assessment for Station WV 58, 2003-2010

Station	Class	Ebb Tide							
		Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Min_Date
WV058.00	P	29	16	6	0.48	88	24.7	38	4/1/2003
		Flood Tide							
		Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Min_Date
		20	11	2.4	0.12	5.5	3.5	38	7/30/2003

Table 12. Geomean and P90 score for WV 58 after Rainfall of 0.5 Inches or Greater, 2004-2010

Station	Class	Count	MFCCount	GM	SDV	MAX	P90	Appd_Std	Min_Date
WV058.00	P	5	2	3	0.16	5.5	4.9	40	5/25/2004



Station WV58 has only exceeded the Approved standard twice since 2002 (Table 12). One occurrence was in 2007 and the most recent was in 2010. Neither occurrence is associated with rainfall; it is unknown what caused the increase in fecal coliform scores.

Table 13. Station WV58 Rainfall and Seasonal Impact 2003-2010

Date	Rain 3	Rain 4	Tide	Sal	Strategy	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
22-Jul-04	0	0.32	H	30	R							<3					
24-Mar-05	0	0	E	29	R			<3									
27-Jun-05	0	0	HF	30	R						<3						
06-Dec-05	0	0	H	30	R												<3
18-Jul-06	0	0	E	30	R							9.1					
28-Nov-06	0	0	L	28	R											<2	
26-Feb-07	0	0	E	32	R		<2										
23-Apr-07	0	0	F	26	R				<2								
23-Jan-08	0	0	H	32	R	<2											
02-Sep-08	0	0	HF	30	R									<2			
02-Feb-09	0	0	F	30	R		<2										
17-Mar-09	0	0	F	31	R			<2									
17-Aug-09	0	0.01	E	30	R								4				
13-Apr-10	0	0.03	H	28	R				<2								
20-Jul-10	0	0	E	30	R							88					
30-Jul-03	0.01	0.06	H	32	R							<3					
29-Nov-05	0.01	0.01	E	25	R											9.1	
16-Oct-06	0.01	0.01	E	30	R										22		
26-Sep-07	0.01	0.01	HE	30	R									62			
14-Jul-08	0.01	0.01	E	30	R							<2					
28-Aug-03	0.03	0.03	HE	30	R								9.1				
08-Mar-04	0.03	0.23	H	30	R			<3									
30-Sep-04	0.05	0.06	HE	30	R									9.1			
19-May-08	0.06	0.06	H	29	R					<2							
20-Jan-04	0.07	0.07	E	30	R	<3											
10-Dec-07	0.07	0.27	HE	30	R												<2
01-Nov-10	0.07	0.08	E	30	R											<2	
01-Jul-03	0.08	0.08	HE	31	R							23					

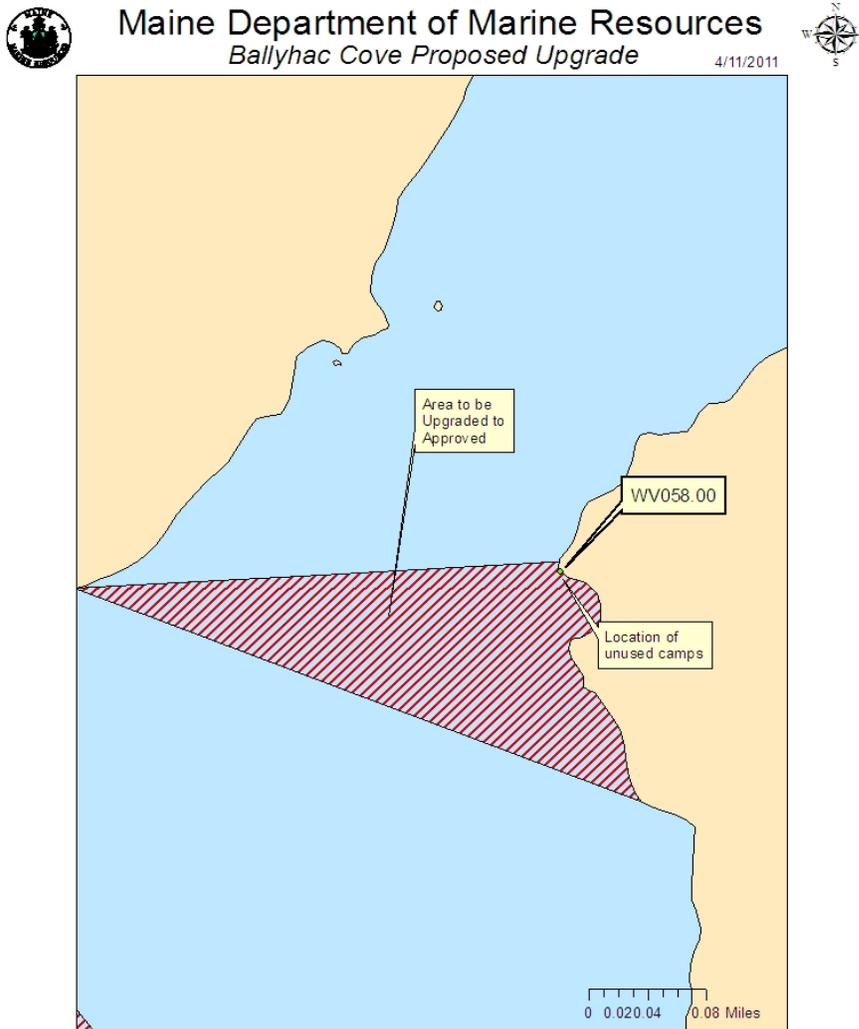


Date	Rain 3	Rain 4	Tide	Sal	Strategy	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
12-Jun-07	0.08	0.08	E	29	R						11						
27-Apr-10	0.08	0.09	H	28	R				<2								
14-Sep-10	0.08	0.08	HF	32	R									<2			
17-Mar-08	0.17	0.17	HE	28	R			4									
25-Apr-06	0.2	0.2	HE	30	R				<3								
05-May-09	0.3	0.35	E	28	R					<2							
22-Sep-03	0.31	0.35	E	30	R									3.6			
01-Aug-05	0.32	0.32	HE	30	R								<3				
26-Apr-04	0.41	0.41	F	28	R				<3								
02-Jun-10	0.51	0.51	H	31	R						<2						
30-Sep-09	0.56	2.04	HE	31	R									<2			
22-Jul-09	0.62	0.62	HE	29	R							10					
28-Oct-08	0.67	0.67	HE	30	R										18		
28-Aug-06	0.71	0.73	H	31	R								5.5				
25-May-04	0.95	1.42	F	30	R					<3							
15-Feb-05	1.00	1.00	HF	30	R		<3										
01-Apr-03	1.04	1.07	E	30	R				<3								
26-Apr-05	1.12	1.16	H	27	R				<3								
08-Aug-07	1.28	1.28	E	29	R								14				
22-May-06	1.54	1.54	E	26	R					<3							
27-Oct-03	1.63	1.63	HE	30	R										23		

With camps no longer in use, and water quality meeting the approved Standard, WV58 is proposed for an upgrade in classification from prohibited to approved for shellfish harvesting, as detailed in Figure 12.



Figure 12. Detail of Ballyhac Cove Area to be Upgraded



Shoreline Survey Activity

Survey work was restricted to drive through assessment. No significant changes were reported throughout the growing area. On 11/16/2010, DMR staff visited a property off of Cline Rd at the northwest edge of Cline Cove. There are three horses on the property that are potentially impacting water quality. Cline cove is monitored by WV 31, which has deteriorated in water quality. The owner was available to talk and was receptive to best management practices.



Aquaculture/Wet Storage Activity

There are six aquaculture lease sites in this growing area. All of the lease sites are located in the Weskeag River.

WES UR (two sites)

Original Date: 10/5/2000 **Effective Date:** 10/5/2000 **Expiration Date:** 10/4/2010

NOAA Chart: 13302

Description: Weskeag River South Thomaston Knox County

Acreage: 7.14

Conditions:

Transfer/Renewal History:

Species Cultivated: oyster eastern / american (*Crassostrea virginica*) - clam soft (*Mya arenaria*) - clam northern quahog / hard (*Mercenaria mercenaria*)

Cultivation Technique(s): Bottom - Suspended

WES BC (two sites)

Original Date: 7/28/2004 **Effective Date:** 7/28/2004 **Expiration Date:** 7/27/2014

NOAA Chart: 13302

Description: Weskeag River South Thomaston Knox County

Acreage: 0.994

Conditions:

Transfer/Renewal History:

Species Cultivated: oyster eastern / american (*Crassostrea virginica*)

Cultivation Technique(s): Suspended

HAM1 08

Original Date: 7/14/2008 **Effective Date:** 4/13/2010 **Expiration Date:** 12/31/2010

NOAA Chart: 13302

Description: Southwest of Ballyhac Cove Weskeag River S. Thomaston Knox County

Acreage: 0.01

Conditions:

Transfer/Renewal History:

Species Cultivated: oyster eastern / american (*Crassostrea virginica*) - oyster european flat (*Ostrea edulis*)

Cultivation Technique(s): Shellfish Raft Tray Racks / Overwintering Cage

HAM2 08

Original Date: 7/14/2008 **Effective Date:** 4/13/2010 **Expiration Date:** 12/31/2010

NOAA Chart: 13302

Description: Southwest of Ballyhac Cove Weskeag River S. Thomaston Knox County

Acreage: 0.01

Conditions:

Transfer/Renewal History:



Species Cultivated: oyster eastern / american (*Crassostrea virginica*) - oyster european flat (*Ostrea edulis*)

Cultivation Technique(s): Shellfish Raft Tray Racks / Overwintering Cage Soft Bags

For more information on the aquaculture sites on the St George River visit the website at:

<http://www.maine.gov/dmr/aquaculture/leaseinventory/muscongusbay.htm>

Recommendation for Future Work

Tenants Harbor:

The southern cove in Tenants Harbor will be surveyed this year by DMR staff. This area is currently classified prohibited, as is it exceeds fecal coliform limits for approved classifications. A survey of the area may shed light on possible pollution sources.

Clark Cove:

Rainfall data will be collected at station WV 24, on the east side of the Clark Island Causeway

Weskeag River:

More data will be collected in the upper river to determine rainfall impact in the upper river.



Appendix A. Key to Water Quality Table Headers

Station = water quality monitoring station

Class = classification assigned to the station; prohibited (P), restricted (R), conditionally restricted (CR), conditionally approved (CA) and approved (A).

Count = the number of samples evaluated for classification, must be a minimum of 30.

MFCNT = the number of samples evaluated with the MTec method (included in the total Count column)

Geo_Mean = means the antilog (base 10) of the arithmetic mean of the sample result logarithm (base 10).

SDV = standard deviation

Max = maximum score of the 30 data points in the count column

P90 = 90th percentile

APPD_STD = the 90th percentile, at or below which the station would meet approved criteria in the absence of pollution sources or poisonous and deleterious substances.

RESTR_STD = the 90th percentile, at or below which the station would meet restricted criteria.